



Programming in Delphi and Java

LESSON 1 WORKSHEET ANSWERS

To write a program to provide information about trees in the botanical garden, you need to declare some variables. Choose the most appropriate data type for the variables. Then choose variable names for these variables, declare the variables and assign the value *Acacia xanthophloea* to the name, 245 to the number of trees, 21.87 to the Average height and NO or false to the Evergreen variable

Description	Data type	Declaration in Delphi	Declaration in JAVA	Assign the value in Delphi	Assign the value in JAVA
Name of the tree	String	Treename: string;	String treeName	Treename:= 'Acacia xanthophloea';	treeName = "Acacia xanthophloea";
Number of this type of tree in the garden	Integer	Number: integer;	Int number	Number := 245;	Number = 245
Average height for this type of tree in meters	Floating point data type/real	AvgHeight: real;	Float avgHeight	AvgHeight:= 21.87;	avgHeight = 21.87;
Evergreen or not	Boolean	Evergreen: boolean;	Boolean evergreen	Evergreen := false;	evergreen = false;

Note: Name is a reserved word in Delphi and should not be used as a variable name

What is the biggest value that can be assigned to a variable of the type **byte**? 255

What happens if you assign a bigger value to the variable than what the data type allows?

You get overflow and might get negative values that are incorrect

TASK ANSWERS

1. Find the errors in the following code:

DELPHI	Corrected:	JAVA	Corrected:
<pre>Var x,y : integer; z : integer; begin x : 5; y = 6; z := x/y; lbloutput.caption := z; end;</pre>	<pre>Var x,y : integer; z : real; begin x := 5; y := 6; z := x/y; lbloutput.caption := floattostr(z); end;</pre>	<pre>Public static void main(string[] args) { int x; x = 5 int y; y :=6; int z = x/y; system.out.println(z); }</pre>	<pre>Public static void main(string[] args) { int x; x = 5; int y; y = 6; float z; z = x/y; system.out.println(z); }</pre>

Note: in Delphi you have to convert the answer z to string to be able to display it. The function floattostr() converts real numbers to string and inttostr() converts integer to string

LESSON 2 WORKSHEET ANSWERS

Fill in the appropriate relational operators for the expressions to be true:

Expression	Answers
8 10	< or <> or !=
'Joe' 'Jack'	< or <> or !=
'A' 'a'	< or <> or !=

Note: Letters and strings are ordered according to their ASCII values



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What is the order of precedence when using boolean and relational operators? NOT AND OR followed by the relational operators

Determine the value of **outcome** in the following cases if C = 10 and D = 20:

DELPHI	JAVA	
Outcome := (C<20) and (D<=20)	outcome = (C<20) && (D<=20)	TRUE
Outcome := NOT(C<D)	Outcome = !(C<D)	FALSE
Outcome := (C>=20) or (D<=20)	outcome = (C>=20) OR (D<=20)	TRUE
Outcome := (C>20) OR (D<300) AND NOT(C>D)	outcome = (C>20) OR (D<300)&&!(C<D)	TRUE

TASK ANSWERS

- Use nested if statements to write a program to display the output "Distinction" if the mark is greater or equal to 80 and less than or equal to 100, "Pass" if the mark is between 40 and 79 (inclusive), "Fail" if the mark is between 0 and 39 (inclusive) and "Invalid" if the mark is > 100 or <0. Use 77 as input for the mark

DELPHI	JAVA
<pre> Var Mark : integer; begin mark := 77; if (mark > 100) OR (mark <0) then lbloutput.caption := "Invalid" else if mark >= 80 and <=100 then lbloutput.caption := "Distinction" else if (mark>= 40) and <=100 then lbloutput.caption := "Pass" else lbloutput.caption := "Fail" </pre>	<pre> int mark = 77; if (mark >= 100) OR (mark <=0){ system.out.println("Invalid"); } else if (mark >= 80) { system.out.println("Distinction") }else if { (mark>= 40) {system.out.println("Pass") }else { system.out.println("Fail") } </pre>

Note: note how you logically exclude values every time you enter the next nested loop

- Use a case statement or switch to display the season when the number of the month is entered: (Spring: 9,10,11; Summer: 12,1,2;Autumn: 3,4,5; Winter: 6,7,8). Use an integer value month with value 3 in your answer.



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DELPHI	JAVA
<pre> Var month : integer; begin month := 3; case month of 9..11: lbloutput.caption := "Spring" 12,1,2: lbloutput.caption := "Summer" 3..5: lbloutput.caption := "Autumn"; 6..8: "Winter" Else lbloutput.caption := "Invalid" End; End;</pre>	<pre> int month = 3; switch (month) { case 9: case 10: case 11: System.out.println("Spring"); break; case 12: case 1: case 2: System.out.println("Summer."); break; case 3: case 4: case 5: System.out.println("Autumn"); break; case 6: case 7: case 8: System.out.println("Winter"); break; default: System.out.println("Invalid month."); break; }</pre>

Note that you can use sub ranges in DELPHI but you have to list all cases in JAVA

LESSON 3 WORKSHEET ANSWERS

Match the columns: Which symbols are used in flowcharts to indicate the following:

INPUT and OUTPUT	C	A	
DECISIONS	A	B	
PROCESSING	B	C	

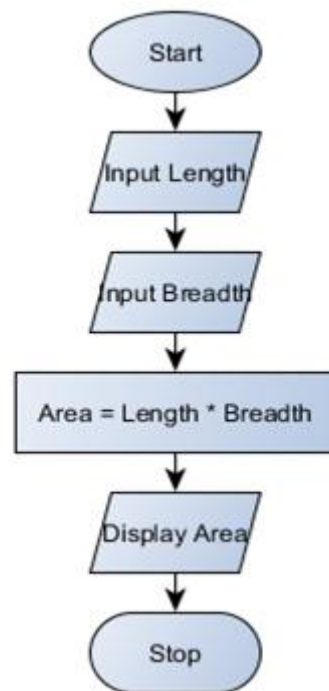
What is the purpose of the arrows in flowcharts? To indicate the flow of the program

TASK ANSWERS

1. Use a sequential flowchart to calculate the area of a rectangle.



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2. Use pseudocode to plan the solution of finding the largest value of two values that were entered and display "equal" if they are the same.

```

Input x
Input y
If x > y then display x
Else if y > x then display y
Else x = y
  
```

3. To swap two values using an extra data container

LESSON 4 WORKSHEET ANSWERS

Name 3 types of loops? For, while, repeat(do while)

Name the three parts of a for loop or the three things the for statement does. Initialise, test (boolean expression) and Change (update) the loop variable

Name the most appropriate loop:

Description	Loop type
To display "Welcome" 10 times	For
To guess a number between 1 and 100 until you get it right	Repeat(Do while)/while
To search through a list until you find a value or reach the end of the list	While
To keep increasing a value by 10% if it is smaller than 50	Repeat(Do while)/while



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TASK ANSWERS

Complete the code for the following programs:

1. To display "Welcome" 10 times

DELPHI	JAVA
<pre>For I := 1 to 10 do Redout.lines.add('welcome');</pre>	<pre>Int I; For (i=1;i<=11;i++){ system.out.println("welcome"); }</pre>

2. To guess a number between 1 and 100 until you get it right

DELPHI	JAVA
<pre>Var Secretnum, guess : integer; begin secretnum := random(100)+1; repeat guess := strtoint(inputbox('Input','Enter your answer','50')) until (guess = secretnum);</pre>	<pre>int randomNumber = (int)(Math.random()*100)+1; Scanner sc=new Scanner(System.in); do { System.out.println("Please input an integer"); Int x; x=sc.nextInt(); while (x!=randomNumber) }</pre>

3. To keep increasing a value by 10% if it is smaller than 50

DELPHI	JAVA
<pre>Var x : real; begin x := 5; while x < 50 do x := x*1.1;</pre>	<pre>float x; while (x < 50){ x=x*1.1 }</pre>

LESSON 5 WORKSHEET ANSWERS

INPUT	PROCESSING	OUTPUT	STORAGE
What is the data type of the input? What kind of data does the input represent?	How can the answer be calculated? What basic operators are needed? What is the formula I need? Do I need a loop? Do I need if statements?	What is the data type of the output? How is the answer to be displayed? Do I have to print or display the data or store in permanently? Do I need to format the output?	Where must the data be stored? Do I have to print or display the data or store in permanently?

TASK ANSWERS

1. Complete IPO tables for the following

- a. Read the radius of a circle. Then determine and display the area of the circle

I	P	O
Input radius	Area = $\pi \times \text{radius} \times \text{radius}$	Display area



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- b. Read the length of three sides of a triangle. Determine if it is a right angled triangle and display a suitable message

I	P	O
Input x,y,z	If $x^2=y^2+Z^2$ or $y^2=x^2+z^2$ or $z^2=x^2+ y^2$ then	Display right angled triangle
	else	Display not right angled triangle

- c. Read a cell phone number. Determine if it starts with a 0 and is 10 characters long to determine if it is a valid cell number and display a suitable message

I	P	O
Input cell	If $cell[1] = '0'$ and $length(cell) = 10$ then	Display valid format
	else	Display not valid format

2. Implement the IPO tables in the previous question

a) `Radius := strtoint(inputbox('Input','Enter the radius','5'));`
`Area := pi*radius*radius`
`Lbloutput.caption := floattostr(area)`

b) `x := strtoint(inputbox('Input','Enter the length of side 1','5'));`
`y := strtoint(inputbox('Input','Enter the length of side 2','3'));`
`z := strtoint(inputbox('Input','Enter the length of side 3','4'));`
`If  $x^2=y^2+Z^2$`
`or  $y^2=x^2+z^2$`
`or  $z^2=x^2+ y^2$  then`
`Lbloutput.caption := 'right angled triangle ' else`
`Lbloutput.caption := 'not right angled triangle ' else`

c) `cell:= strtoint(inputbox('Input','Enter cell number-no spaces','0823456789'));`
`If  $cell[1] = '0'$  and  $length(cell) = 10$  then`
`Lbloutput.caption := 'valid format' else`
`Lbloutput.caption := 'not valid format'`

LESSON 6 WORKSHEET ANSWERS

What is the purpose of the program planned in the flowchart? Loop until the user inputs a value between 8 and 12

What does UML stand for? Unified Modelling Language

TASK ANSWERS

- Identify possible actors, communication and use cases in the following scenario:
 A client brings a pet to the vet. The Vet examines the pet and prescribes medicine or performs a procedure if necessary. The client pays.



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ACTORS	USE CASE
client	Makes appointment Buys food, medicine etc Pays account owns pet
Vet	Diagnose Prescribes Performs procedure Invoice client
Pet	Owned by client

2. The following program is supposed to input 10 values in a loop and find the smallest value entered. The output is incorrect. Use a trace table to show how the values of all variables in the program change as each line of code is executed and find the mistake. Explain what to do to debug the program

DELPHI	JAVA
<pre> 1. Var smallest, value, count : integer; Begin 2. Value := strtoint(inputbox('Input', 'Enter an integer', '0')); 3. Smallest := 0; 4. For count := 0 to 8 do Begin 5. Value := strtoint(inputbox('Input', 'Enter next integer', '0')); 6. If value < smallest then smallest := value End; 7. Lbloutput.caption := inttostr(smallest); </pre>	<pre> Scanner sc=new Scanner(System.in); 1. Int value; System.out.println(" Enter an integer: "); 2. int value = sc.nextInt(); 3. int smallest = 0; 4. for (int count = 0; count < 8; count++) { 5. System.out.println(" Enter next integer: "); value = sc.nextInt(); 6. if (value < smallest) smallest = value } 7. System.out.printf("Lowest value is %d ", value); </pre>

Line	Value	Count	Value < smallest	Smallest
2	7	?	F	?
3	7	?	F	0
4	7	0	F	0
5	9		F	0
			F	
			F	

Set smallest to the first value entered instead of 0 otherwise it will only change when you enter negative values

LESSON 7 WORKSHEET ANSWERS

Give one word for the following:



Free your brain

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Information hiding so that other classes have to use accessors and mutators to see or modify information in the class

A method to make private variables in a class available

A method used to modify private variables in a class

Members that can be accessed anywhere where the class can be referenced

Members that are invisible outside of the program or unit where its class is declared

Special method to initialise a new instance of a class

A Value received by a method of a class to change the value of a field of a class

A data type indicating the data format to be returned by a method

Encapsulation

Accessor

Mutator

Public member

Private member

Constructor

Parameter

Return type

TASK ANSWERS

1. Study the class diagram below representing a client:

Client	
Fields	Methods
- fID: String - fName: String - fDateOfBirth: String - fAmount : double	+ constructor Create/member(ID,name) + getID(): String + getName(): String + getAmount() :double + setAmount(newAmount)

- a. Identify a constructor in the class diagram above + constructor Create/member(ID,name)
- b. Identify a mutator in the class diagram above +setAmount(newAmount)
- c. Identify an accessor in the class diagram above + getID(): String
+getName(): String
+getAmount() :double
- d. Identify a parameter in the example new amount

2. Code the accessor method getID

DELPHI	JAVA
Function getID : string; Begin Return: fID; End;	Public String getID(){ Return fID }

3. Code the mutator setAmount

DELPHI	JAVA
Procedure setAmount(newAmount:double); Begin fAmount := newAmount End;	Public void setAmount(double newAmount){ fAmount = newAmount }



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LESSON 8 WORKSHEET ANSWERS

Complete the sentences:

Modularity is a programming method in which the source code for an object can be written and maintained independently of the source code for other objects.

Modularity allows one object to send data to another object or ask the object to invoke a method

The detail of what goes on inside the module is not important to the system as a whole, as long as the module fulfils its role correctly. This is called information hiding

Global variables are accessible to all members in the class (can be used in all event handlers)

Local variables are declared in methods or code blocks and their scope is limited to that method

Method parameters can only be accessed in the method body

TASK ANSWERS

1. Consider the code (provided), keeping the scope of variable in mind. Predict the output:

Output:

X = 5 the local value of x

Z = 2 the global value of z

Zx = 20 local x = 5 passed to parameter z and in function the global value of x (4) is used to multiply

LESSON 9 WORKSHEET ANSWERS

Name 3 methods to manipulate a string: A method on the string type is called to manipulate the string. It can be used to find the length of a string. It can be used to count the number of times a given word or character appears in a string. It can be used to convert lowercase into uppercase. It can be used to reverse the order of characters, e.g. abcd to dcba.

Complete the code to:

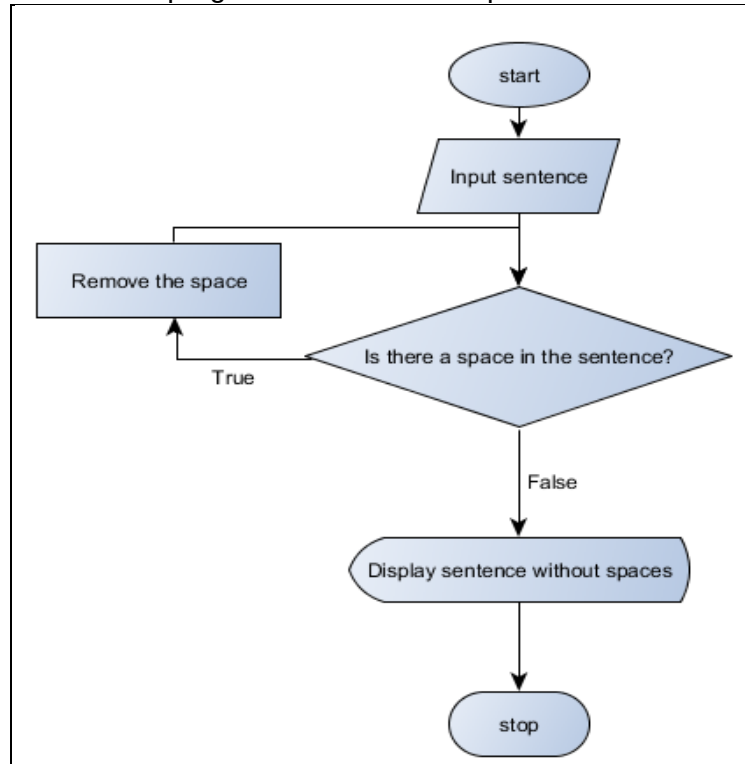
	DELPHI	JAVA
Convert the string called sentence to uppercase and assign it to variable new	New := uppercase(sentence)	String new = sentence.toUpperCase();
Convert the string called sentence to lowercase and assign it to variable new	New := lowercase(sentence)	String new = sentence.toLowerCase();
Copy the first three characters from the string sentence and assign it to variable new	New := copy(sentence,1,3)	String New = sentence.substring(0,3)
Assign the length of the string sentence to len	Len := length(sentence);	Int len = sentence.length();
Assign the 4 th character in the string sentence to new	New := sentence[4]	Char new := sentence.charAt(3)
Assign the position of the first space in sentence to place	Place := pos(' ',sentence)	Int place = sentence.indexOf(' ')



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TASK ANSWERS

1. Create a flowchart for the program to remove the spaces in a sentence.



LESSON 10 WORKSHEET ANSWERS

Write down the declaration for a constants array called arrSuits, to display the four suits in a deck of cards

JAVA `String[] arrSuits = {'Hearts','Spades','Clubs','Diamonds'};`

DELPHI `arrSuits = array[0..3] of string = ('Hearts','Spades','Clubs','Diamonds');`

What will be assigned to the variable called output in the following cases:

DELPHI	JAVA	
Output := arrsuits [0]	Output = arrSuits[0]	Hearts
Output := arrSuits[1+2]	Output = arrSuits[1+2]	Diamonds
Output := arrSuits[1]+arrsuits[2]	Output = arrSuits[1]+arrsuits[2]	SpadesClubs

TASK ANSWERS

1. Write a loop to populate an array of length 10 with random integers between 20 and 30.



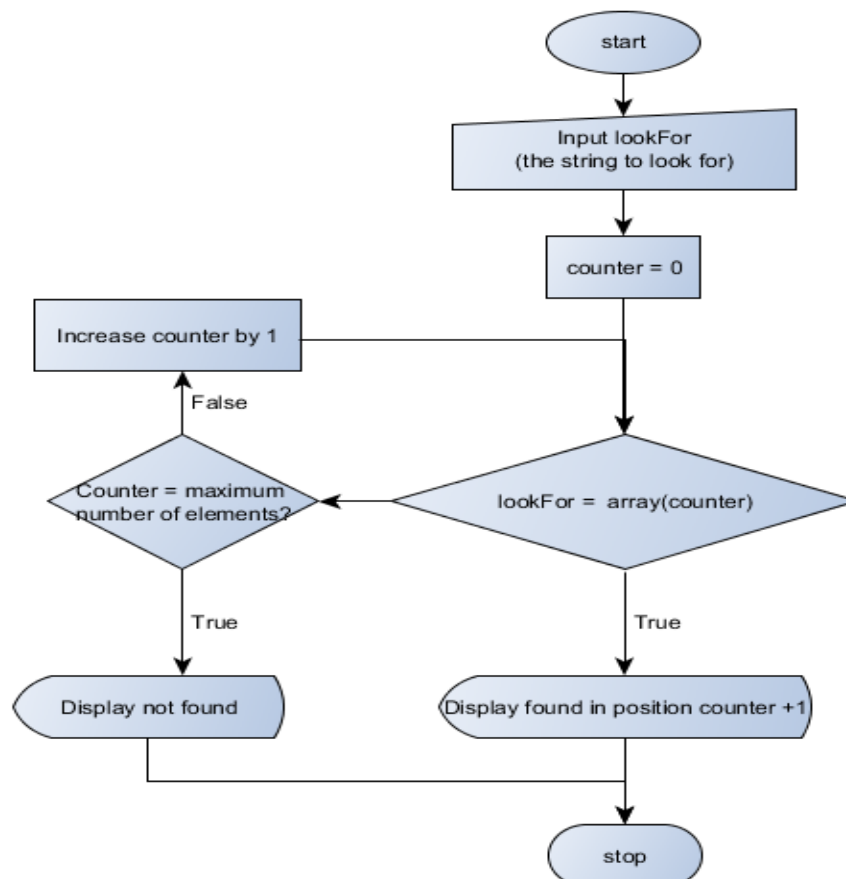
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DELPHI	JAVA
<pre> Var arr : array[0..9] of integer; k : integer; Begin Randomize; For k := 0 to 9 do Arr[k] := random(11)+20 </pre>	<pre> int arr[]=new int[10]; for(int i=0;i<10;i++){ arr[i]= Math.round(Math.random() * (10)) + 20; } </pre>

2. Display the integers

DELPHI	JAVA
<pre> Var arr : array[0..9] of integer; k : integer; Begin For k := 0 to 9 do Redoutput,lines.add(inttostr(Arr[k])) </pre>	<pre> System.out.println("Random numbers are: "); for(int i=0;i<random.length;i++){ System.out.println(random[i]); } } } } </pre>

3. Complete the empty boxes in the flowchart that is supposed to search through an array of 100 names. The search must stop as soon as you find a match or when you reach the end of the array





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LESSON 11 WORKSHEET ANSWERS

Complete the sentences:

- Bubble sort works by swapping two adjacent elements if they are not in order. The process repeats until no more swapping is necessary
- Insertion sort finds elements that are out of order and puts these elements in the right position
- Selection sort finds the largest/smallest element in the array and puts it in the correct position. It then repeats the process with the remaining part of the array until all elements are in the right order

Explain why you need a temporary variable when you swap two values in an array. Otherwise you will overwrite one of the values and in effect duplicate one value

TASK ANSWERS

1. Declare an array of integer with 4 rows and 5 columns (An array with 4 arrays of 5 integer)

DELPHI	JAVA
Var arr : array[0..3,0..4] of integer;	int[][] arr = new int[4][5];

2. Write the code to calculate the sum of all the numbers in the 2D array declared in 1

DELPHI	JAVA
<pre>Sum := 0; For col := 0 to 4 do For row := 0 to 3 do Sum := sum + Arr[row,col] ; Showmessage('Sum'+ inttostr(sum))</pre>	<pre>// Sum all elements Int Sum = 0; for (int col=0; col<arr.length; col++) { for (int row=0; row<arr[col].length; row++) { sum = sum + arr[col][row]; System.out.print("SUM " +sum); } }</pre>

3. Complete the code to delete all items in column 3 of the array (set the values to 0)

DELPHI	JAVA
<pre>For row := 0 to 3 do Arr[row,3] := 0;</pre>	<pre>for (int row=0; row<arr[col].length; row++) { arr[3][row] := 0; }</pre>

4. Use a method to sort the elements in the array arr that has n integer elements

DELPHI	JAVA
<pre>Procedure bubble_sort(var arr: Tarr;n: integer);</pre>	<pre>Public static void bubble_sort(int arr[], int n){ Int i,j,keep = 0; for (i=0; i < n; i++) { for (j=0; j< n-1; j++) { if (arr[i] < arr[j]) { keep = arr[i]; arr[i] = arr[j]; arr[j] = keep } } } }</pre>



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LESSON 12 WORKSHEET ANSWERS

Comment on the types of loops that are used to populate and display 2D arrays. Use two For Loops, nested one inside the other when creating a 2D array. The outer For Loop – rows; inner For Loop – columns.

List 5 examples where 2D arrays could be used in programs.

An array variable can be used to store many data items of the same kind under the same name. Each item is distinguished from the other by means of an index. Examples:

1. A program to book seats for a movie
2. A program that can do the times table and display it in a string grid
3. Useful to store objects for programming sketches that involve some sort of grid or matrix
4. A program that lets a user enter some values at the beginning of each day, such as the number of appointments
5. A program that contains to check if specific items or seats or similar are available, for example, to allow people to book the seat they want on a bus or at a music festival.

Explain what is meant by the following declaration:

DELPHI	JAVA
Var arr : array[0..3,0..4] of integer;	int[][] arr = new int[4][5];

DELPHI:

It declares a 2D array of integers with 4 columns and 5 rows

JAVA:

It declares a variable, arr of type int[][], and it initializes that variable to refer to a newly created object. That object is an array of arrays of ints. Here, the notation int[4][5] indicates that there are 4 arrays of ints in the array A, and that there are 5 ints in each of those arrays.

Complete the code to populate a 2D array with random integers between 1 and 10.

DELPHI	JAVA
For col := 0 to 3 do For row := 0 to 4 do Arr[col,row] := random(10) + 1;	<pre> for(int col=0;col<4;col++){ for int row= 0;row<3;row++){ arr[col][row]= Math.round(Math.random()*(10))+1; } } </pre>



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TASK ANSWERS

1. Write the code to print a 2D array `int[ ][ ] arr = new int[4][5]` in rectangular form:

DELPHI	JAVA
<pre>Sum := 0; For row := 0 to 4 do Begin For col := 0 to 3 do Line := line + inttostr(Arr[row,col]); Redout.lines.add(line) ; End;</pre>	<pre>for (int row=0; row<arr.length; row++) { for (int col=0; rcol<arr[row].length; row++) { System.out.print(" " + arr[col][row]); } System.out.println("");</pre>

LESSON 13 WORKSHEET ANSWERS

Define a class. A class is a blueprint for an object. The class groups together values that logically belong together in a structure like a new data type. A class is made up of fields (private variables that contain data values) and methods (procedures and functions). The class is not a variable – you need to declare an object to use

Define an object. An object created from a class is called an instance of the class. One object is a bundle of variables and related functions and procedures

True or false: Many objects can be created using the same class. True. Many objects can be created from the same class, just like many variables can be declared of the same data type.

TASK ANSWERS

1. Define a class Tfood. The type of food is of the type string. (other information also provided)

DELPHI	JAVA
<pre>Food = class(Tobject) Private fType : string; fFat,fProtein,fCarbo, fEnergy : integer;</pre>	<pre>Public class Food { Private string type Private int fat; Private int protein; Private int carbo; Private int energy;</pre>

2. Write a public constructor method which accepts values for all five private fields through the parameters to initialise the private fields

DELPHI	JAVA
<pre>constructor create(t,f,p,c,e: integer); begin ftype := t; fFat := f; fProtein := p; fCarbo := c; fEnergy := e; end;</pre>	<pre>Public Food String t, int f,int p,int c, int e { Type = t; Fat = f; Protein = p; carbo = c; energy = e; }</pre>



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3. Write an public accessor method getKJ to make the number of kilojoules available in the main class

DELPHI	JAVA
function getKJ : integer; begin result := fenergy end;	Public int getKJ() { Return energy }

4. Write an public accessor method getType to make the type of food available in the main class

DELPHI	JAVA
function getKJ : string; begin result := ftype end;	Public String getKJ() { Return type }

5. Write an public accessor lowFat to return the boolean value true if the is less than 10

DELPHI	JAVA
function lowfat : boolean begin result := fFat < 10 end;	Public boolean lowFat { Return = fat < 10 }

LESSON 14 WORKSHEET ANSWERS

Can you use arrays as data types for the fields that define the attributes? Yes

What will happen if you declare the procedures and functions in the private section? Won't be able to use them in any other class (application)

Assume the following class has been created (see information provided in worksheet).

Declare an array named arrFood that can hold 25 objects of the class Food

DELPHI	JAVA
Var arrFood: array[1..25] of Food	Food[] = arrFood= new Food[25];

Create and dynamically populate the array of objects with random values between 0 and 100 for all the integer parameters and the names of the food "A", "B" .. "y"

DELPHI	JAVA
Var c : char; Counter : integer; Begin Counter := 0; For c := 'A' to 'Y' do Begin arrFood[counter] := Food.create(c,random(101),random(101),ran dom(101) , random(101))	char letter; int counter = 0; for (letter = 'A'; letter <= 'Y'; letter++){ int ff = (int)(Math.random()*100)+1; int pp = (int)(Math.random()*100)+1; int cc = (int)(Math.random()*100)+1; int ee = (int)(Math.random()*100)+1; counter ++; arrFood[counter] = new Food(letter,ff,pp,cc,ee); }



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TASK ANSWERS

- Write the code to search through the array of objects to find the food with the name entered by the user.

DELPHI	JAVA
<pre> Var i : integer; Found : boolean; Searchfood : char; Begin I:= 0; Found:= false; Searchfood := inputbox('Input', 'Enter the letter for the foodtype', 'C')[1]; While (found = false) and (I < 25) do Begin Inc(i); If arrFood[i].gettype= searchfood then Found := true; End; If found then showmessage(arrFood[i].getkj) else Showmessgae('Not found'); End; </pre>	<pre> int i = 0; boolean found = false; System.out.println(); System.out.print("Enter a food : "); char searchFood = inKb.readLine().toUpperCase(); while (found = false)&&(i<25){ i++; if(arrFood[i] .getType().toUpperCase().equals(searchFood) found = true } If found System.out.println(arrFood[i].getKJ); Else System.out.println("not found"); </pre>

LESSON 15 WORKSHEET ANSWERS

Explain polymorphism with an example. Polymorphism means the ability to take more than one form. This is something similar to a word having several different meanings depending on the context. It is the important concept of OOP, from the Greek concept 'poly' (means many) and 'morphism' (means form). For example, the same function or function name is used but the behaviour will be different.

Name the two types of polymorphism. Method overloading(static polymorphism...early binding) and method overriding(dynamic polymorphism...late binding).

Explain inheritance with an example. Object-oriented programming allows classes to inherit commonly used state and behavior from other classes. For example, Food, in our previous example can now become the superclass of meat and fruit.

TASK ANSWERS

- Give one example of where polymorphism can be used.

Possible answer: Superclass animal with a move() method and subclasses bird and dog where move() will mean completely different things. Superclass shape where a area method is declared and subclasses Circle, Rectangle where the meaning of area is completely different.

- Fill in the missing words:

You don't have to write code in parent - you actually just know you will need a method , but the child class will determine exactly what the content of the method will be.

Put only the signature in parent – not specific –, but every child class MUST have a method with exactly the same signature, where the method is specified.



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LESSON 16 WORKSHEET ANSWERS

Why is it necessary to close files at the end of a procedure? CloseFile frees the memory space that was previously reserved for the file. It also sends any data in the file buffer to the file on disk and updates the file's directory details on disk - and, it usually counts 1 mark!!!

Text files are used sequentially. What does this mean? Have to read through all the lines to get to a specific line (like video tape)

Is it better to use While loop or a repeat Until (Do while) loop to read through the file? Motivate WHILE - take into account the (unlikely) possibility that the file exists but does not contain any data.

TASK ANSWERS

3. Match the columns with the basic keywords for data access to text files:

Function that links the file variable in RAM to the *.txt file on disk	B	AssignFile(tf,'abc.txt')
Opens an existing file for reading. It puts the file pointer at the beginning of the file.	F	Reset (tf)
Creates and opens a new file. If existing file with the same name existed, the new one will overwrite the old	G	Rewrite(tf)
Opens an existing text file for adding on at the end. It puts the file pointer at the end of the file	D	Append(tf)
Reads a line from the file into variable line and then move the file pointer to the beginning of next line.	E	Readln(tf,line)
Writes a line and then writes an end-of-line marker to the text file (moves file pointer to the next line)	H	Writeln(tf,line)
Function that returns true if the file exists and false if it does not exist	D	Fileexists('abc.txt')
Function that returns true if you have reached the end of the file and false if there are more lines of text (or end of line markers) to read from the file	C	Eof (tf)

LESSON 17 WORKSHEET ANSWERS

Name three types of errors that can occur in programming and give an example of each.

Compiler errors including syntax errors: e.g. when you do not declare a variable, spell incorrectly, do not convert to the correct data type.

Runtime errors: try to open a file that does not exist, input letters when integer input is expected.

Logical errors: your program runs, but do not deliver the expected output.

Which type of error can be prevented when you use exception handlers? Runtime errors

Describe what you understand as good documentation in programming. Documentation is the written text that accompanies computer software. It either explains how it operates or how to use it. You should comment in your programming code to explain the purpose of each method and provide a user manual for the end users of your program. Technical details like object design and database design should be available for other programmes who want to improve or build on your code.



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Describe the types of data to include in your test cases. Test that your program will work correctly with:

1. No data -Generate and display error messages.
2. Valid data –Program should function as per requirements
3. Invalid data set: - check application behaviour for negative values, alphanumeric string inputs and generate and display error messages.
4. Illegal data format: - System should not accept data in invalid or illegal format-generate error messages
5. Boundary /extreme data(very large or very small)
6. Large amounts of data

TASK ANSWERS

1. How do you use the debugger in your software program to step through your program one line at a time. Press F7 repeatedly or use the icon.
2. How do you set watches in the software program? Ctrl-F5 or use the menu
3. How do you add breakpoints in the software program? Use the menu Run, Add breakpoint or click in the left hand side margin.
4. List a couple of bugs that you have encountered in programs while stepping through the code. Loops or selection code does not have brackets or begin and end statements in the correct places. Incorrect conditions in loops. Variables redeclared or out of scope.

LESSON 18 WORKSHEET ANSWERS

List 4 design principles when creating a graphical user interface.

1. Provide visual appeal
2. Clarity - The interface and language used should be easy to understand
3. Consistency - Similar components should have a similar look, position and use
4. Efficiency - Minimize eye and hand movements
(or other meaningful answers)

How do you make the interface aesthetically pleasing?

- Provide meaningful contrast between screen elements.
- Create groupings.
- Align screen elements and groups.
- Provide three dimensional representation
- Use colours and graphics effectively and simply.

Identify the components on the following GUI

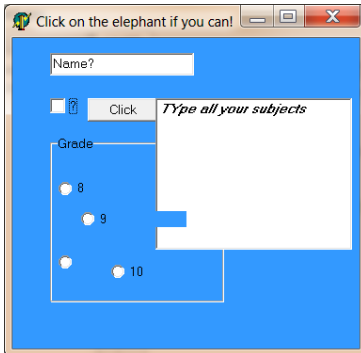
- A: Edit
- B: Check box
- C: Radio group
- D: Combobox
- E: Richedit
- F: Button

TASK ANSWERS

Consider the following user interface and use the design principles to comment on the design:



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1. Layout not visually appealing – no alignment, overlap, too small and too many components
2. Lack of Clarity - Some components not labelled
3. Inconsistency - Click button should be bottom right if it is the last thing to do
4. In-efficiency - Have to type all subjects – could have selected with check boxes
5. (or other meaningful answers)

LESSON 19 WORKSHEET ANSWERS

Name a few events that can be used. On Click for buttons, Double click, Menu item is selected, Mouse events onMouseMove, OnCreate, onCLose, OnActivate for windows, OnKeypressed, OnKeyUp, OnkeyDown.

Name 4 types of event listeners. Action listener, MouseListener, MouseMotionListener, WindowListener.

TASK ANSWERS

1. Match the columns: Choose the appropriate events.

To activate an eventhandler when a button is clicked - = OnClick
To change the color of the form when you move the mouse over the panel = OnMouseMove
To capture the letter that you enter on the keyboard to make an object move on the form = FormKeyPress
To be able to use the arrow keys to make an object move on the form = FormKeyUp

2. Complete the code to make an image move on the form when the arrow keys are Pressed

DELPHI	JAVA
<pre> procedure TForm1.FormKeyUp(Sender: TObject; var Key: Word; Shift: TShiftState); begin if key = vk_left then img1.Left := img1.Left - 10; if key = vk_right then img1.Left := img1.Left + 10; if key = vk_up then img1.top := img1.top - 10; if key = vk_down then img1.top := img1.top+ 10; end; </pre>	<pre> { public void keyPressed(KeyEvent ke) { switch (ke.getKeyCode()) { case KeyEvent.VK_RIGHT: x = x + 10; case KeyEvent.VK_LEFT: </pre>



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	<pre> x = x - 10; case KeyEvent.VK_DOWN: y = y - 10; case KeyEvent.VK_UP: y = y + 10; } this.repaint(); } }</pre>
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LESSON 20 WORKSHEET ANSWERS

Write down what the following acronyms stand for:

- SQL Structured Query Language
 ODBC Open Database connectivity
 JDBC Java Database connectivity
 ADO ActiveX data components

TASK ANSWERS

Given the table in ACCESS (see worksheet): Complete SQL statements for the following queries:

- Display the Model Name and fuel tank size fields from the models table with column headings "Car" and "Fuel tank"
SELECT [Model Name] as Car , tank as [Fuel tank] from models
- Display all fields of models where the tank field is blank (empty)
SELECT *FROM models where tank is null
- Display all the fields from the models table WHERE the modelname starts with A to H
SELECT * FROM models where [model name] between "A" and "I"
- Display all the fields from the models table WHERE the model description is longer than 10 characters
SELECT * FROM models where len([model name]) > 10
- Display all fuel tank capacities only once
SELECT Distinct tank FROM models
- Display Model names starting with an H
SELECT [model name] FROM models where [model name] like "H%"
- Write a query where the user can input the number of seats and then all models with that number of seats are displayed
SELECT [model name] from models where seats = '+seats; (where seats is a variable and the user entered the value
- Display the model names sorted in descending order by seats and then ascending order by fuel tank capacity
SELECT [model name] FROM models ORDER BY seats desc, tank ';
- Display the maximum range of all cars in the models table;
SELECT max(range) as Maximum from models



Free your brain

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- x. Display the number of models in the models table
SELECT couontrange) as [Number of cars] from models
- xi. Change the Air_bags field for the Nissan 4x4 double cab (ModelID = 18) to True.
UPDATE models SET air_bags = true WHERE modelID = 18
- xii. DELETE records from the rental table WHERE the car registration is VBN307KZN
DELETE * from rentals WHERE carregistration = "VBN307KZN"
- xiii. Display the number of cars in each group listed in the groups table, according to the rentals table
SELECT [model name], sum(date_until - date_from) as [Total days] from models,rentals where models.modelID= rentals.modelID group by [model name]
- xiv. Insert a new car into the Models table.

ModelID	Model Name	A/C	ABS_brakes	Tank	Seats	GroupID
25	Opel Corsa	Yes	No	45	4	Economy

INSERT into models (modelID,[model name],[a/c],abs_brakes,tank,seats,groupID) values (25,"Opel Corsa",yes, no, 45,4,4,"Economy")'